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| 10/721,613 | 11/25/2003 | Razvan Iordache | 14XZ129307 | 5611 |

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| EXAMINER | |
|---|---|
| SMITH, JEFFREY S | |
| ART UNIT | PAPER NUMBER |
| 2635 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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| 3 MONTHS | 12/21/2006 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/721,613 | IORDACHE ET AL. | |
| | Examiner | Art Unit | |
| | Jeffrey S. Smith | 2635 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *25 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ___-___.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Specification*

The abstract of the disclosure and the specification are objected to because "a radiological thicknesses" is unclear, it could mean "a radiological thickness," or "a plurality of radiological thicknesses." Correction is required. See MPEP § 608.01(b).

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: "the parameter that defines the maximum differential gain level in the starting dynamic range" as recited in claims 8-11 is missing from the specification.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

For claim 1, "a radiological thicknesses" is unclear. If there are a plurality of radiological thicknesses, then this term should be "a plurality of radiological thicknesses." If there is only one radiological thickness, then this term should be "a radiological thickness."

"the dynamic range of the image with reduced dynamic range and heightened contrast is compressed" is unclear, this could be restating the fact that "processing the context image...to

obtain an image with a reduced dynamic range" has produced a compressed dynamic range, or this could mean that the dynamic range is being reduced (or compressed) a second time. Given the fact that the term "is compressed" is currently a part of the step of "adding together" instead of a separate step of "compressing a second time," this term is interpreted to mean that the compression was previously performed by "processing the context image...to obtain an image with a reduced dynamic range."

The phrase "the anatomical structures" lacks antecedent basis.

For claim 2, "at their position" is unclear. Please specify the noun that corresponds to the pronoun "their."

For claims 3, 4 "or by a statistical filtering of another type" is unclear. Another type should be specified or this phrase should be removed from the claim.

For claims 5-7, "the function" lacks antecedent basis.

For claims 8-15, "the user" lacks antecedent basis.

For claims 16-21 "the computations" and "the two functions" lack antecedent basis.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-21 rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent Application EP 1 113 192 by Nicolas et al. ("Nicolas") in view of U.S. Patent No. 5,550,888 issued to Neitzel et al. ("Neitzel").

For claim 1, Nicolas discloses acquiring an image of an object with a radiology apparatus and computing a radiological thicknesses (see element 15 of Figure 4), filtering the image of radiological thicknesses (16), subtracting the context image to obtain an image of the details (18), processing the context image (17), and adding together the image with reduced dynamic range and the image of enhanced details (19).

Nicolas does not disclose processing the context image by means of a second table computed from the image of the radiological thicknesses to obtain an image of coefficients which will then weight the image of the details to obtain an image of enhanced details.

Neitzel discloses processing the context image (Lo) by means of a second table (LUT2, element 34) computed from the image of the radiological thicknesses to obtain an image of coefficients (G) which will then weight the image of the details (mult. 35) to obtain an image of enhanced details (Ht) (see figure 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of compensation of thickness of an organ disclosed by Nicolas to include the method of enhancing the detail image disclosed by Neitzel for the advantage that the transformation functions are no longer formed by a more or less complex calculation from the density function and the contrast function entered by the user, because in this case these functions already represent the transformation functions, as taught by Neitzel at column 10 lines 20-24.

For claim 2, Neitzel discloses weighting the image of the details by an image of coefficients to obtain the image of enhanced details as shown in Figure 5.

For claims 3, 4 Nicolas discloses building the context image from the image of radiological thicknesses by a medial filtering as shown in Figure 4.

For claims 5-7, Nicolas discloses the function applied to each pixel of the context image to obtain the image with reduced dynamic range is positive, linear by pieces, and non-decreasing (see column 6 lines 9-24).

For claims 8-11 Nicolas and Neitzel both disclose that the compression of the dynamic range is controllable by parameters selected by a user.

For claims 12-15, Neitzel discloses that the operations of processing the images of context and details are modified by a function selected by the user.

For claims 16-21, Nicolas discloses that the functions used to modify the images are predefined as functions of proportion of object structure as discussed in the title and abstract.

***Double Patenting***

Claims 1-21 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-18 of U.S. Patent No. 6,415,015 issued to Nicolas et al. ("Nicolas '015") in view of U.S. Patent No. 5,550,888 issued to Neitzel et al. ("Neitzel").

For claim 1, Nicolas in claim 1 recites acquiring an image of an object with a radiology apparatus and computing a radiological thicknesses, filtering the image of radiological thicknesses, subtracting the context image to obtain an image of the details, processing the

context image, and adding together the image with reduced dynamic range and the image of enhanced details.

Nicolas does not claim processing the context image by means of a second table computed from the image of the radiological thicknesses to obtain an image of coefficients which will then weight the image of the details to obtain an image of enhanced details.

Neitzel discloses processing the context image (Lo) by means of a second table (LUT2, element 34) computed from the image of the radiological thicknesses to obtain an image of coefficients (G) which will then weight the image of the details (mult. 35) to obtain an image of enhanced details (Ht) (see figure 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of compensation of thickness of an organ disclosed by Nicolas to include the method of enhancing the detail image disclosed by Neitzel for the advantage that the transformation functions are no longer formed by a more or less complex calculation from the density function and the contrast function entered by the user, because in this case these functions already represent the transformation functions, as taught by Neitzel at column 10 lines 20-24.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following are currently assigned to General Electric Company and disclose methods of compensating for the thickness of an organ or reducing the dynamic range of an x-ray image

to adapt to the resolution of a display: U.S. Application Publication No. 2003/0152257 by Lienard et al. (organ thickness), U.S. Patent Nos. 6,956,977 issued to Langan et al. (abstract, compressing dynamic range to that of a display device), 6,766,064 issued to Langan et al. (abstract, compressing dynamic range to that of a display device), 6,721,441 issued to Granfors (compressing 12 bits to 8 bits at column 2 lines 11-35), 6,718,056 issued to Bothorel et al. (user selects brightness and contrast parameters), 6,633,661 issued to Lienard et al. (organ thickness), and 6,546,124 issued to Hopple et al. (compressing the image to a desired gray scale while preserving contrast).

U.S. Patent No. 5,357,549 issued to Maack et al. discloses a method of compressing dynamic range of an x-ray image that equalizes low-pass picture values, multiplies high-pass picture values, and adds the modified low and high pass values together.

U.S. Patent No. 6,381,352 issued to Nelson discloses a method of re-scaling an image to a dynamic range of a display by enhancing contrast and compressing dynamic range from 16 bits to 8 bits (column 3 lines 28-39 and column 4 lines 50-53).

U.S. Patent Nos. 6,285,798 issued to Lee discloses a method of decomposing an input image into a low-frequency component and a high-frequency component, modifying the tone scale of the low-frequency component and amplifying the high frequency component, then combining the modified low and high frequency components to form a new image with smaller dynamic range and retained details.

U.S. Patent No. 6,069,979 issued to VanMetter discloses linear and non-linear compression curves in Figures 5a,b.

U.S. Patent No. 5,638,138 issued to Hickman discloses compressing 16 bits to 10 bits (column 4 lines 20-35).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey S. Smith whose telephone number is 571 270-1235. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marvin Lateef can be reached on 571 270-1245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JSS
JSS
December 14, 2006

MARVIN LATEEF
SUPERVISORY PATENT EXAMINER